Targeting Multi-Technology Approaches to Sediment Remediation Using Risk Analysis Tools

Peconic River Remedial Alternatives Workshop

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BROOKHAVEN NATIONAL LABORATORY

GeoSyntec Consultants

GeoSyntec Credentials

Assessment, engineering, and construction-related services at NPL and RCRA sites, DOE facilities

Siting, design, construction management, CQA, and closure activities for more than 500 waste disposal facilities

Major remediation projects involving industrial wastes, low level radioactive waste, and RCRA hazardous waste.

Aerojet
ARCO
DuPont
General Electric
Hercules
Honeywell
NASA
Natl. Science Foundation
Reynolds Metals
Tenneco
U.S. Air Force
U.S. Navy
U.S. Army Corps of Engineers
U.S. Dept of Energy

Sediment Removal and Handling Techniques

- Riverine, estuarine, and coastal environments
- Physical and chemical characteristics of sediments for optimizing remedial strategies
- Phytoremediation/Phytostabilization
- Excavation and Removal
- Solidification/Stabilization
- On-Site Containment

USING Risk Analysis Tools

- Ecological and Human Health Risk Assessment
- Transport, Fate and Risk Modeling
- Spatial Analysis – Risk Mapping
  - GIS
  - SADA

Current Technologies Allow

- Categorizing areas by potential ecological risk
  - View by different receptors of interest, benthic or aquatic, or predators
  - Integrate risks from multiple chemicals
- Spatial Averaging
  - Specific points may be of interest for “Not-to-Exceed” values
  - Area-wide representations generally key for final conditions
- Re-mapping of risk reduction achieved
  - “What-if” scenarios
  - Help decide when/where to stop

Pesticide Impacted Creek in Coastal Georgia

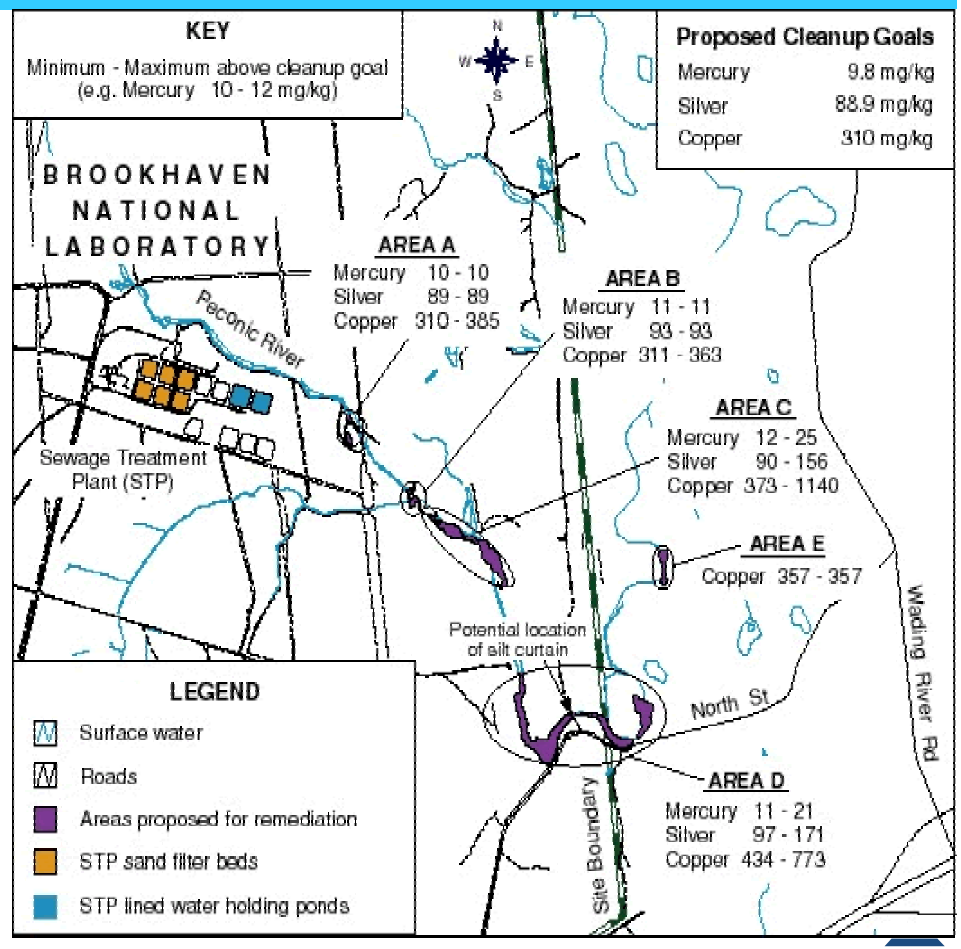
- Concentration/Risk Mapping
  - Remove the “hottest” spots to the get the most out of remediation resources
  - Update mapping based on confirmation sampling
- Identified areas requiring removal based on
  - Specific negotiated concentration limits
  - Achieving overall concentration/risk reduction

Removal vs. Sedimentation/Attenuation

- Removal of Selected Areas
  - Minimized ecological disruption
  - Minimized disposal materials
- Revegetation, bank stabilization, natural sedimentation
  - Sediment burial and attenuation an option for pesticides
  - "Enhanced" natural progression of degradation still yields risk reduction

Why a Multi-Technology Solution for the Peconic River?

- Specific depositional areas
- Differing concentrations
- Differing flow and depth features
- Areas of clearly ecotoxic metal concentrations requiring isolation



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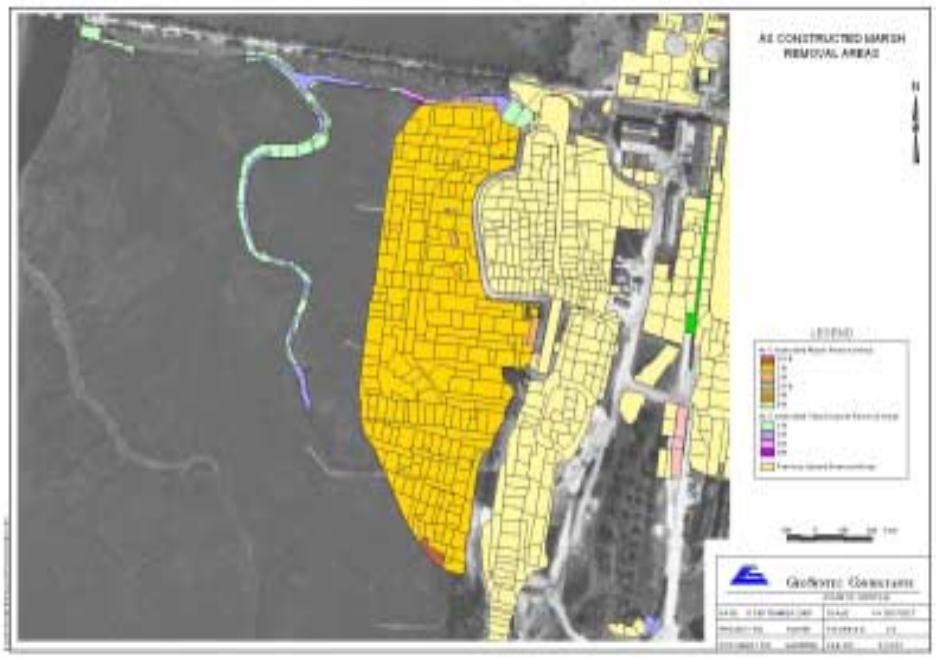
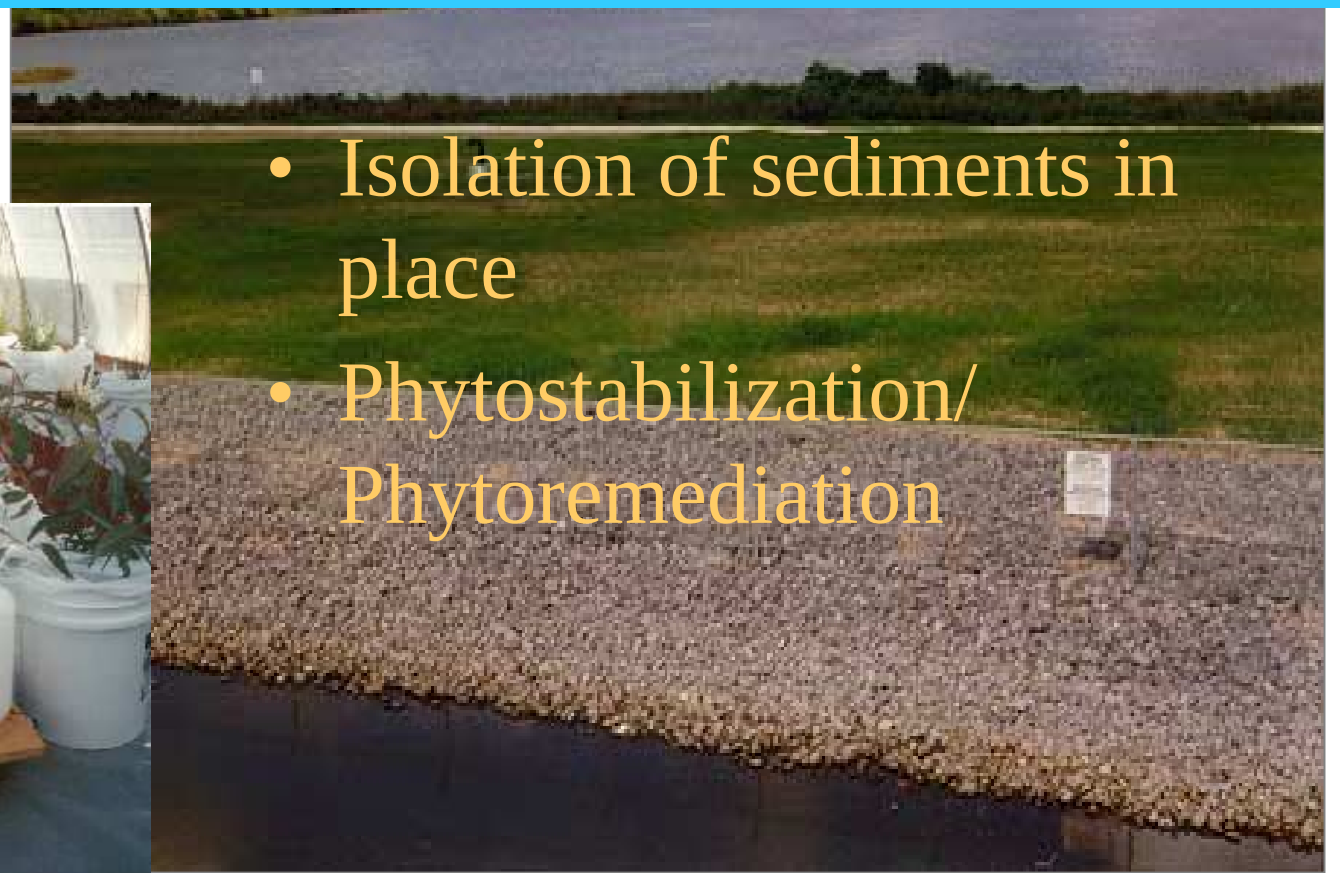
What Technologies Could We Guide through Risk Mapping on the Peconic?

- Sediment Removal with on-site containment



♦ Construction of new features for habitat diversification

More Alternatives Supported by Risk-Based Considerations



- Isolation of sediments in place
- Phytostabilization/ Phytoremediation

GeoSyntec Proposes . . .

- Multi-faceted treatment program which applies the right effort to the right place
- Treatment program based on containment on-site
- In-situ capping where possible and efficient
- Consolidate impacted sediments where necessary and practical
- Consider phytoremediation and natural attenuation where applicable

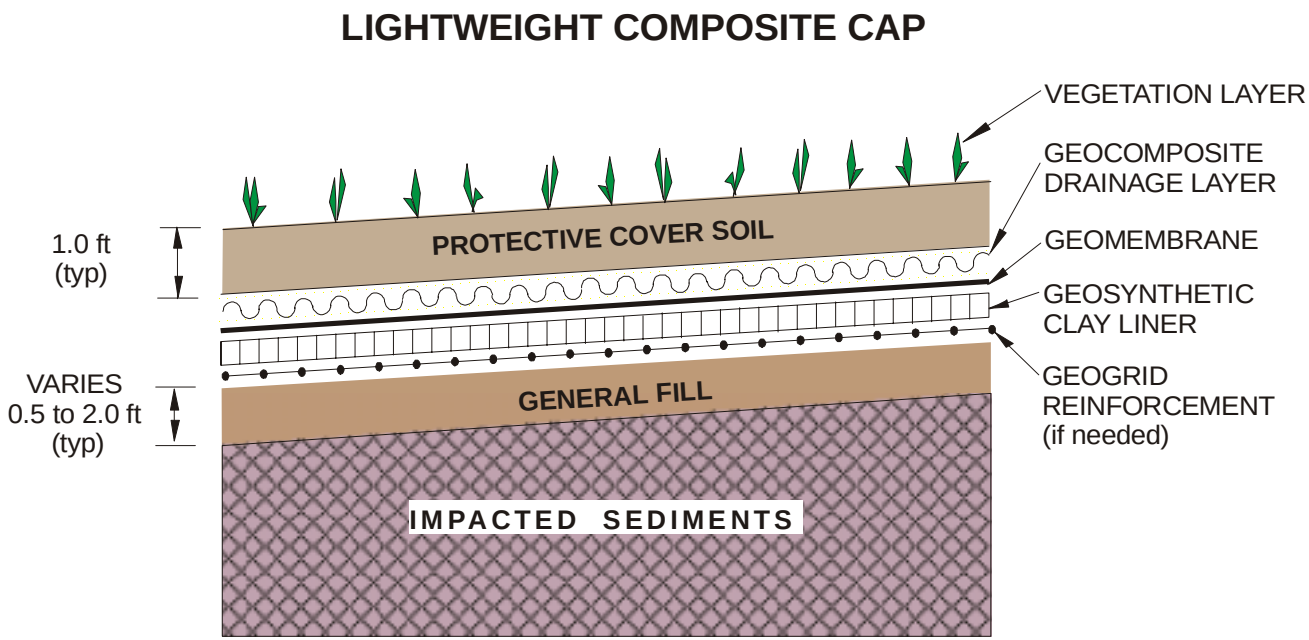
GeoSyntec Proposes . . .

- Base treatment boundaries on latest risk assessments
- Tailor treatment to specific conditions on the ground
- Use “surgical” relocation techniques when required
- Contain and immediately re-sediment any dispersed solids

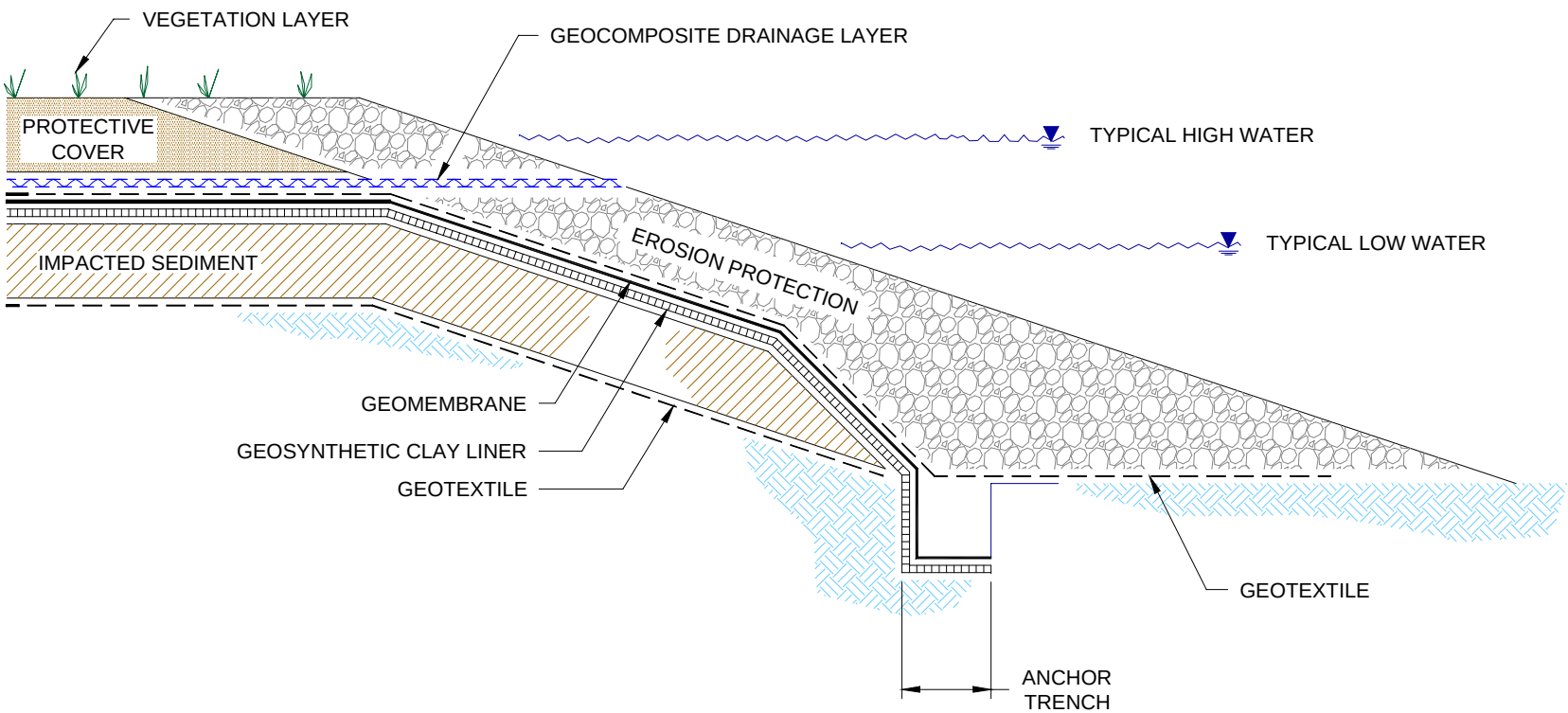
On-Site Containment

- Environmentally sensitive
  - minimize disturbance
  - minimize handling
  - phyto friendly
- Neighborhood friendly
- Regulators like it
- Potential cost savings

Uplands Capping

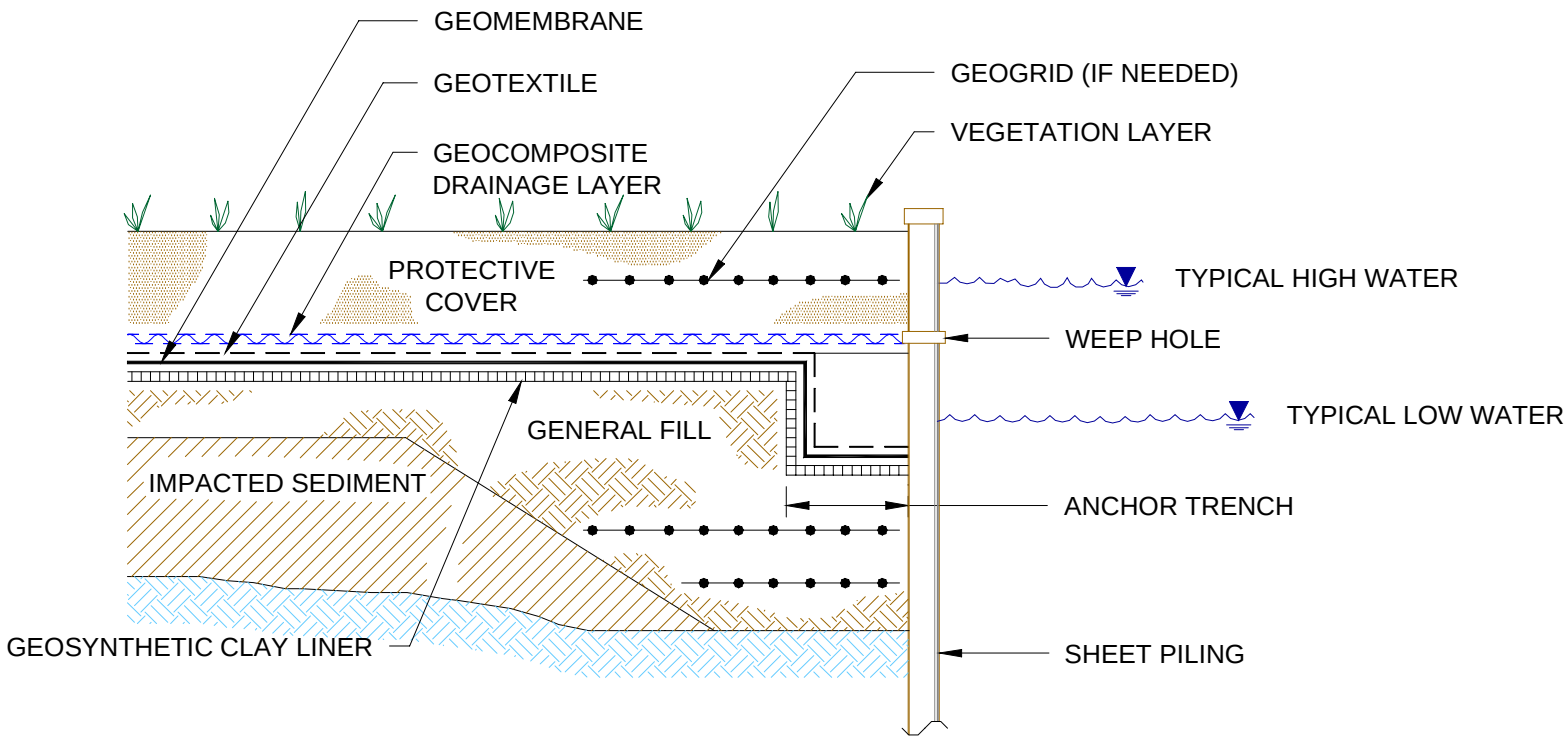


Wetlands Capping



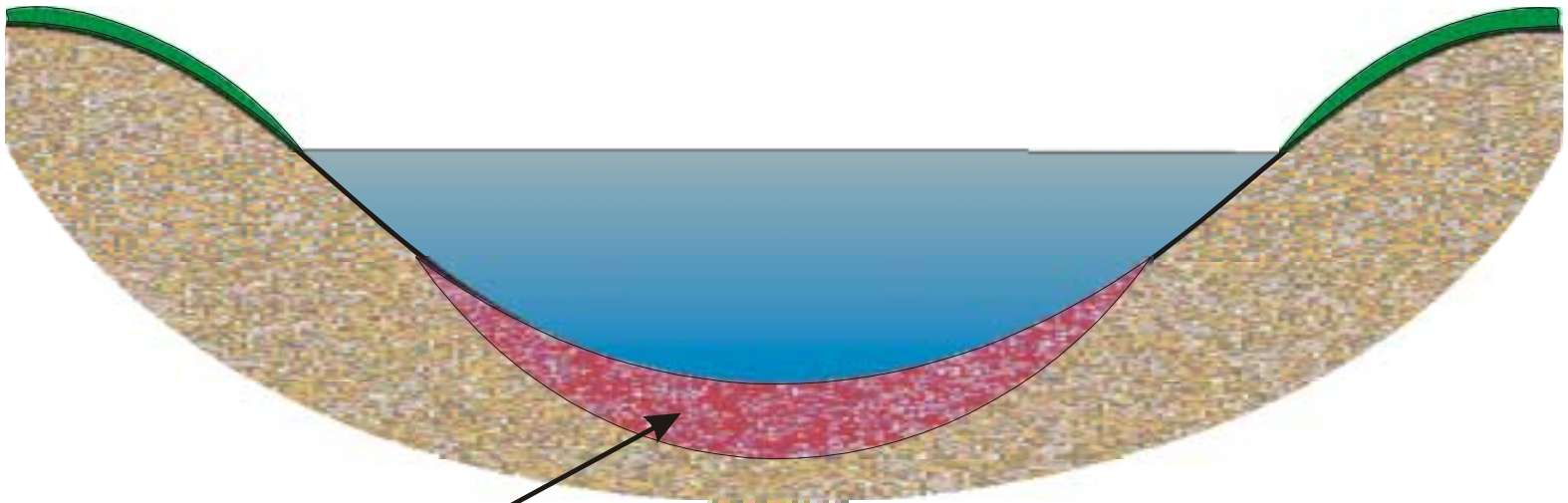
Sloped Edge Condition with Erosion Protection

Wetlands Capping

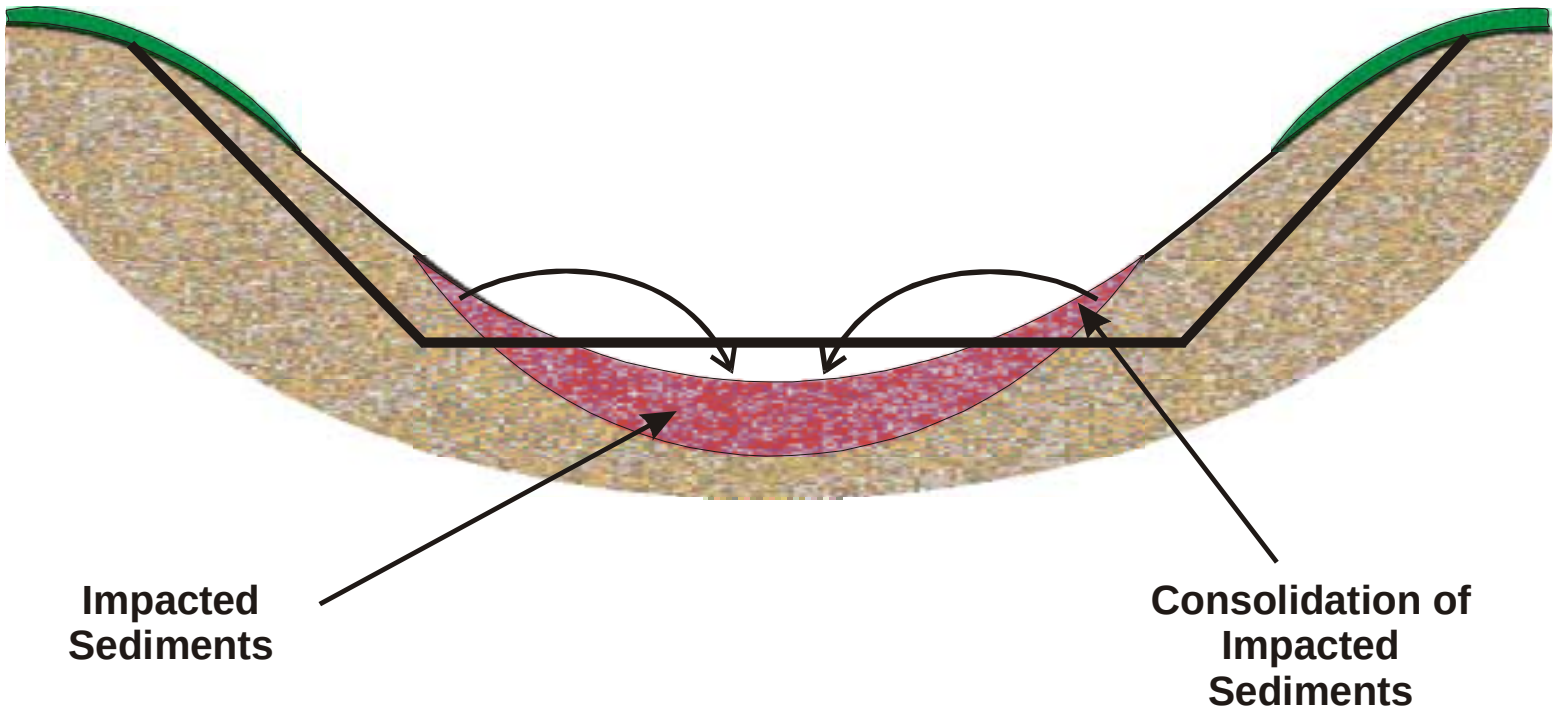


Edge Condition Using Sheet Pile

Sub-Aqueous Capping



Sub-Aqueous Capping



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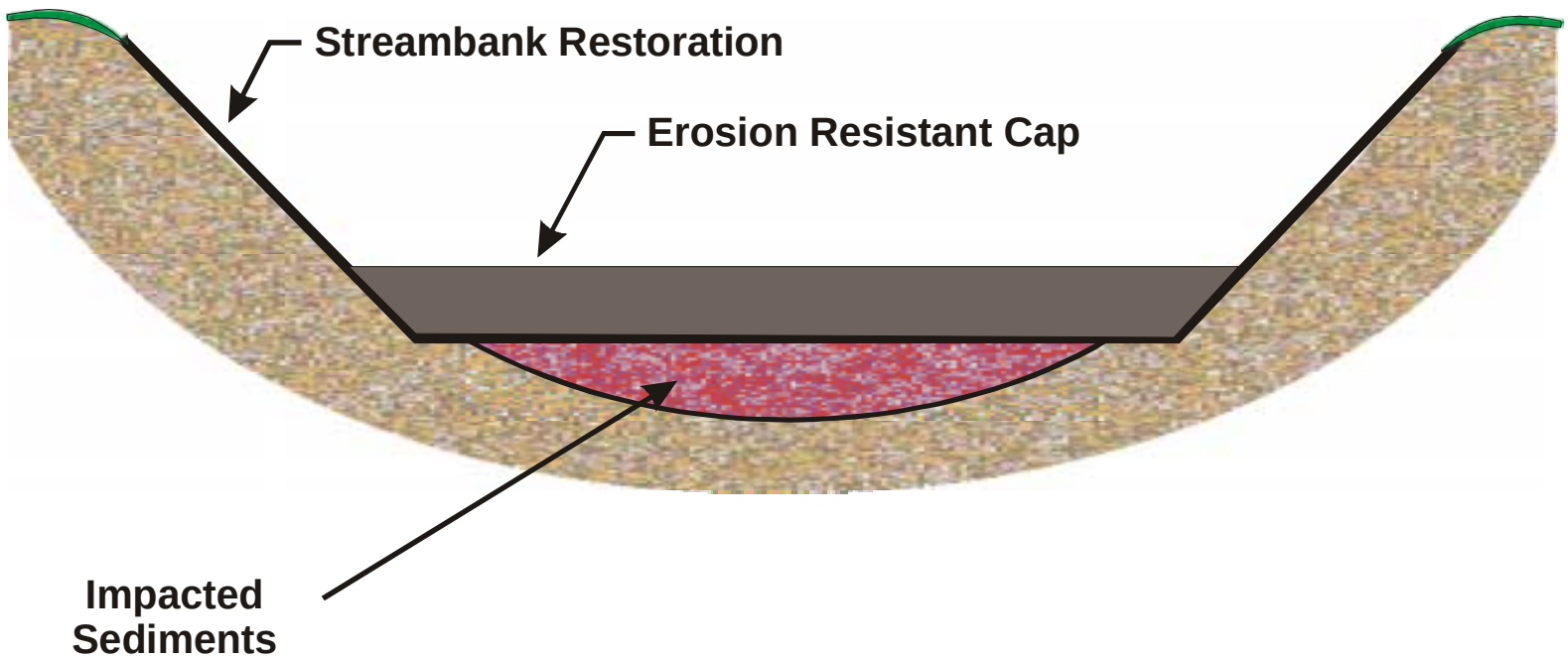


Relevant Projects

LCP Chemicals NPL Site

Bailey Disposal NPL Site

Terry Creek Sediment Remediation

LCP Chemicals NPL Site

Former chloroalkali production facility and petroleum refinery

Termed by EPA as the "Love Canal of the South"

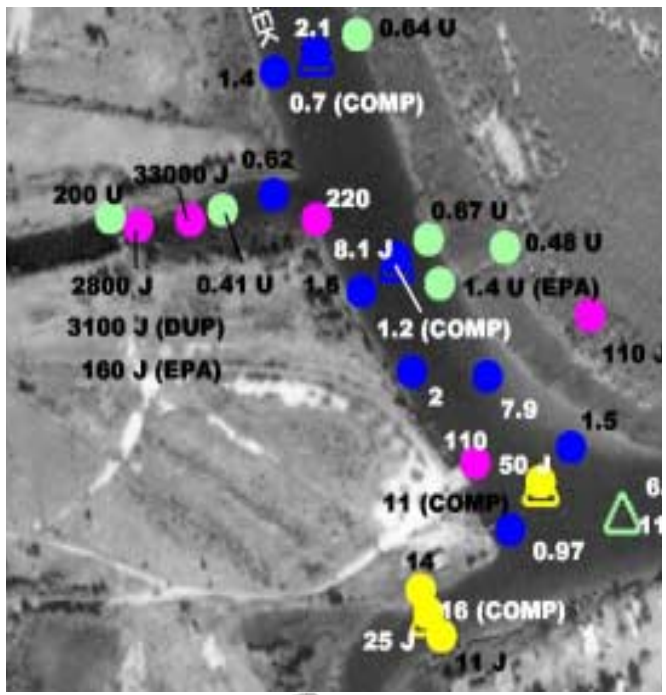
- Impacts mainly in top 1 ft of material
- Real-time impacted materials delineation
- Isolation of impacted areas using plastic sheetpile
- "Surgical" removal of vegetation, root mat, soils, and selected "hot spots"
- Residual risks managed by placement of soil cap and revegetation/restoration of marsh

Bailey Disposal NPL Site

- Isolation of impacted areas using earth embankment
- Specialized light-weight, long-reach equipment excavated 4 inches of marsh
- Soft sediment stabilization and consolidation
- On-site light-weight, uplands capping

Terry Creek Sediment Remediation

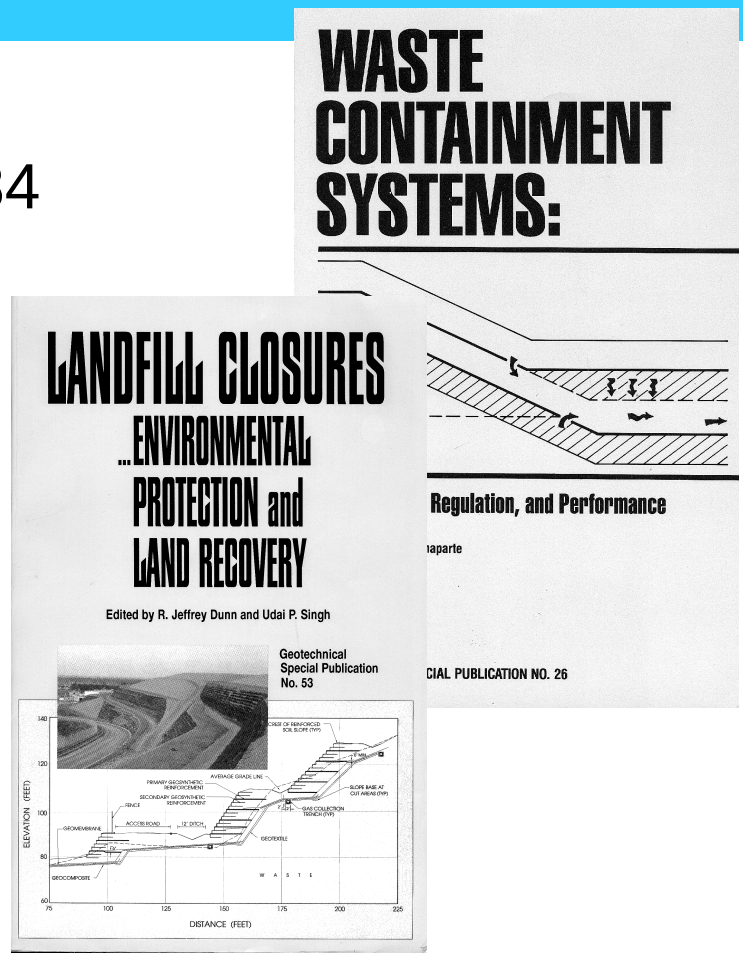
Former toxaphene manufacturing facility with outfall ditch leading to saltwater marsh



- Isolation of impacted areas using turbidity curtains
- Sediments removed, stabilized, and consolidated
- Real-time delineation of impacts
- “Surgical removal of creek bed during tidal fluctuations
- Sediment management allowed “Subtitle D” disposal

Containment Systems

- Technology leader since 1984
- J.P. Giroud honored with lecture series in 1994 by International Geosynthetics Society
- ASCE Special Publications
- EPA Guidance Documents



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Phytoremediation

"Among the leaders in this sector are … GeoSyntec Consultants"

David J. Glass

D. Glass Associates Inc.

Needham, MA

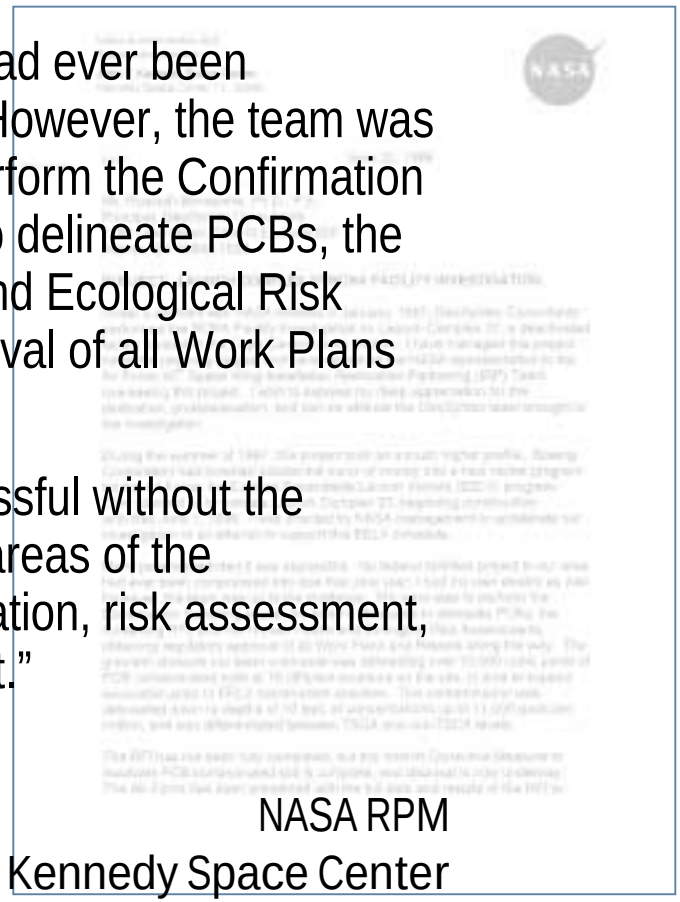
Current Market Trends in Phytoremediation

International Journal of Phytoremediation: Vol 1 No. 1 pp 1-8, 1999.

Project Integration

"No federal facilities project in our area had ever been compressed into less than one year … However, the team was up to the challenge. We were able to perform the Confirmation Sampling phase, the Interim Measures to delineate PCBs, the Screening RFI, and the Human Health and Ecological Risk Assessments, obtaining regulatory approval of all Work Plans and Reports along the way.

"This project would not have been successful without the expertise of GeoSyntec personnel in all areas of the investigation: fieldwork, GIS, data evaluation, risk assessment, office support and resource management."



NASA RPM
Kennedy Space Center

Thank you, organizers …

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?QUESTIONS?

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